



Agilent E2251A M-Module Carrier

Installation and Wiring Manual

Where to Find it - Online and Printed Information:

System installation (hardware/software)	VXIbus Configuration Guide*
Installing M-Modules onto M-Module Carrier ..	This Manual (Service-Trained Personnel only)
Installing M-Module Carrier into VXI Mainframe	This Manual (Service-Trained Personnel only)
M-Module configuration and wiring	M-Module Hardware Manual
M-Module programming example (SCPI)	Agilent E2251A M-Module User's Manual
M-Module programming example (register-based)	Agilent E2251A M-Module User's Manual
VXI <i>plug&play</i> programming	VXI <i>plug&play</i> Online Help
VXI <i>plug&play</i> example programs	VXI <i>plug&play</i> Online Help
VXI <i>plug&play</i> function reference.....	VXI <i>plug&play</i> Online Help
Soft Front Panel information	VXI <i>plug&play</i> Online Help
VISA language information.....	VISA User's Guide



*Supplied with Agilent Command Modules, Embedded Controllers, and VXLink.



Agilent Technologies



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Certification

Agilent Technologies, Inc. certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (formerly National Bureau of Standards), to the extent allowed by that organization's calibration facility, and to the calibration facilities of other International Standards Organization members.

AGILENT TECHNOLOGIES WARRANTY STATEMENT

AGILENT PRODUCT: B-size and C-size VXI modules

DURATION OF WARRANTY: 1 year

1. Agilent warrants Agilent hardware, accessories and supplies against defects in materials and workmanship for the period specified above. If Agilent receives notice of such defects during the warranty period, Agilent will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.
 2. Agilent warrants that Agilent software will not fail to execute its programming instructions, for the period specified above, due to defects in material and workmanship when properly installed and used. If Agilent receives notice of such defects during the warranty period, Agilent will replace software media which does not execute its programming instructions due to such defects.
 3. Agilent does not warrant that the operation of Agilent products will be interrupted or error free. If Agilent is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product.
 4. Agilent products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.
 5. The warranty period begins on the date of delivery or on the date of installation if installed by Agilent. If customer schedules or delays Agilent installation more than 30 days after delivery, warranty begins on the 31st day from delivery.
 6. Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by Agilent, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.
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-

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Agilent E2251A M-Module Carrier Installation Manual
Edition 1



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Documentation History

All Editions and Updates of this manual and their creation date are listed below. The first Edition of the manual is Edition 1. The Edition number increments by 1 whenever the manual is revised. Updates, which are issued between Editions, contain replacement pages to correct or add additional information to the current Edition of the manual. Whenever a new Edition is created, it will contain all of the Update information for the previous Edition. Each new Edition or Update also includes a revised copy of this documentation history page.

Edition 1 June 1997

Edition 2 February 1998

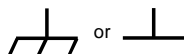
Safety Symbols



Instruction manual symbol affixed to product. Indicates that the user must refer to the manual for specific **WARNING** or **CAUTION** information to avoid personal injury or damage to the product.



Indicates the field wiring terminal that must be connected to earth ground before operating the equipment — protects against electrical shock in case of fault.



Frame or chassis ground terminal—typically connects to the equipment's metal frame.



Alternating current (AC)



Direct current (DC).



Indicates hazardous voltages.

WARNING

Calls attention to a procedure, practice, or condition that could cause bodily injury or death.

CAUTION

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

WARNINGS

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), an uninterruptible safety earth ground must be provided from the mains power source to the product input wiring terminals or supplied power cable.

DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes.

For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type. DO NOT use repaired fuses or short-circuited fuse holders.

Keep away from live circuits: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

DO NOT service or adjust alone: Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

WARNINGS (contd.)

In a cleanroom environment, some switch modules (such as the E2270A, 2271A, 2273A, etc) are capable of switching voltages that could cause bodily injury or death to an operator. Special precautions must be adhered to (discussed below) when applying voltages in excess of 60Vdc, 30Vac rms, or 42.4 Vac peak for a continuous, complex waveform.

Module connectors and test signal cables connected to them must be made NON-accessible to an operator who has not been told to access them: It is a supervisor's responsibility to advise an operator that dangerous voltages exist when the operator is instructed to access connectors and cables carrying these voltages. Making cables and connectors that carry hazardous voltages inaccessible is a protective measure keeping an operator from inadvertent or unknowing contact with these harmful voltages. Cables and connectors are considered inaccessible if a tool (e.g., screwdriver, wrench, socket, etc.) or a key (equipment in a locked cabinet) is required to gain access to them. Additionally, the operator cannot have access to a conductive surface connected to any cable conductor (High, Low, or Guard).

Assure the equipment under test has adequate insulation between the cable connections and any operator-accessible parts (doors, covers, panels, shields, cases, cabinets, etc.): Verify there are multiple and sufficient protective means (rated for the voltages you are applying) to assure the operator will NOT come into contact with any energized conductor even if one of the protective means fails to work as intended. For example, the inner side of a case, cabinet, door, cover, or panel can be covered with an insulating material as well as routing the test cables to the module's front panel connectors through non-conductive, flexible conduit such as that used in electrical power distribution.



DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014

Manufacturer's Name: Agilent Technologies, Incorporated
Manufacturer's Address: *Measurement Product Generation Unit*
815 14th ST. S.W.
Loveland, CO 80537 USA

Declares, that the product

Product Name: C Size M Module Carrier
Model Number: E2251A
Product Options: *This declaration covers all options of the above product(s).*

Conforms with the following European Directives:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and carries the CE Marking accordingly

Conforms with the following product standards:

EMC	Standard	Limit
	IEC 61326-1:1997+A1:1998 / EN 61326-1:1997+A1:1998 CISPR 11:1997 +A1:1997 / EN 55011:1998 IEC 61000-4-2:1995+A1:1998 / EN 61000-4-2:1995 IEC 61000-4-3:1995 / EN 61000-4-3:1995 IEC 61000-4-4:1995 / EN 61000-4-4:1995 IEC 61000-4-5:1995 / EN 61000-4-5:1995 IEC 61000-4-6:1996 / EN 61000-4-6:1996 IEC 61000-4-11:1994 / EN 61000-4-11:1994	Group 1 Class A ^[1] 4kV CD, 8kV AD 3 V/m, 80-1000 MHz 0.5kV signal lines, 1kV power lines 0.5 kV line-line, 1 kV line-ground 3V, 0.15-80 MHz 1 cycle, 100%
	Canada: ICES-001:1998 Australia/New Zealand: AS/NZS 2064.1	
Safety	IEC 61010-1:1990+A1:1992+A2:1995 / EN 61010-1:1993+A2:1995 Canada: CSA C22.2 No. 1010.1:1992 UL 3111-1:1994 IEC 950(1991) + A1(1992) + A2(1993) + A3(1994) EN 60950(1992) + A1(1992) + A2(1993) + A3(1994) CSA C22.2#950(1995) UL 1950(1995)	

Supplemental Information:

^[1] *The product was tested in a typical configuration with Agilent Technologies test systems.*

September 5, 2000

Date

Name

Quality Manager

Title

For further information, please contact your local Agilent Technologies sales office, agent or distributor.
Authorized EU-representative: Agilent Technologies Deutschland GmbH, Herrenberger Strabe 130, D 71034 Böblingen, Germany

M-Module Installation

This manual provides the following information:

- Installing M-Modules in the E2251A Carrier including:
 - Setting Logical Addresses
 - Attaching Field Wiring and Strain Relief
 - Installing RFI Dress Panels
- Installing the E2251A Carrier in a VXIbus Mainframe
- M-Module installation verification.
- Removing M-Modules from the Carrier.

For general information about the E2251A M-Module Carrier or for M-Module programming information, refer to the *E2251A M-Module Carrier User's Manual*. For information about specific M-Modules, refer to that M-Module's User's Manual. *VXIplug&play* drivers, downloadable SCPI drivers, and Soft front panels are available on the CD ROM provided with the Carrier and M-Modules. The E2251A does not support MA-Modules.

WARNING SERVICE-TRAINED PERSONNEL ONLY. The information in this manual is for service-trained personnel who are familiar with electronic circuitry and are aware of the hazards involved. To avoid personal injury or damage to the instrument, do not perform procedures in this manual or do any servicing unless you are qualified to do so.

Caution All installation, wiring, and configuration procedures in this chapter are to be done with power **DISCONNECTED** from the VXI mainframe and power **DISCONNECTED** from any external wiring/cabling. To prevent equipment damage, **DISCONNECT** the mainframe's power before installing any module into the mainframe.

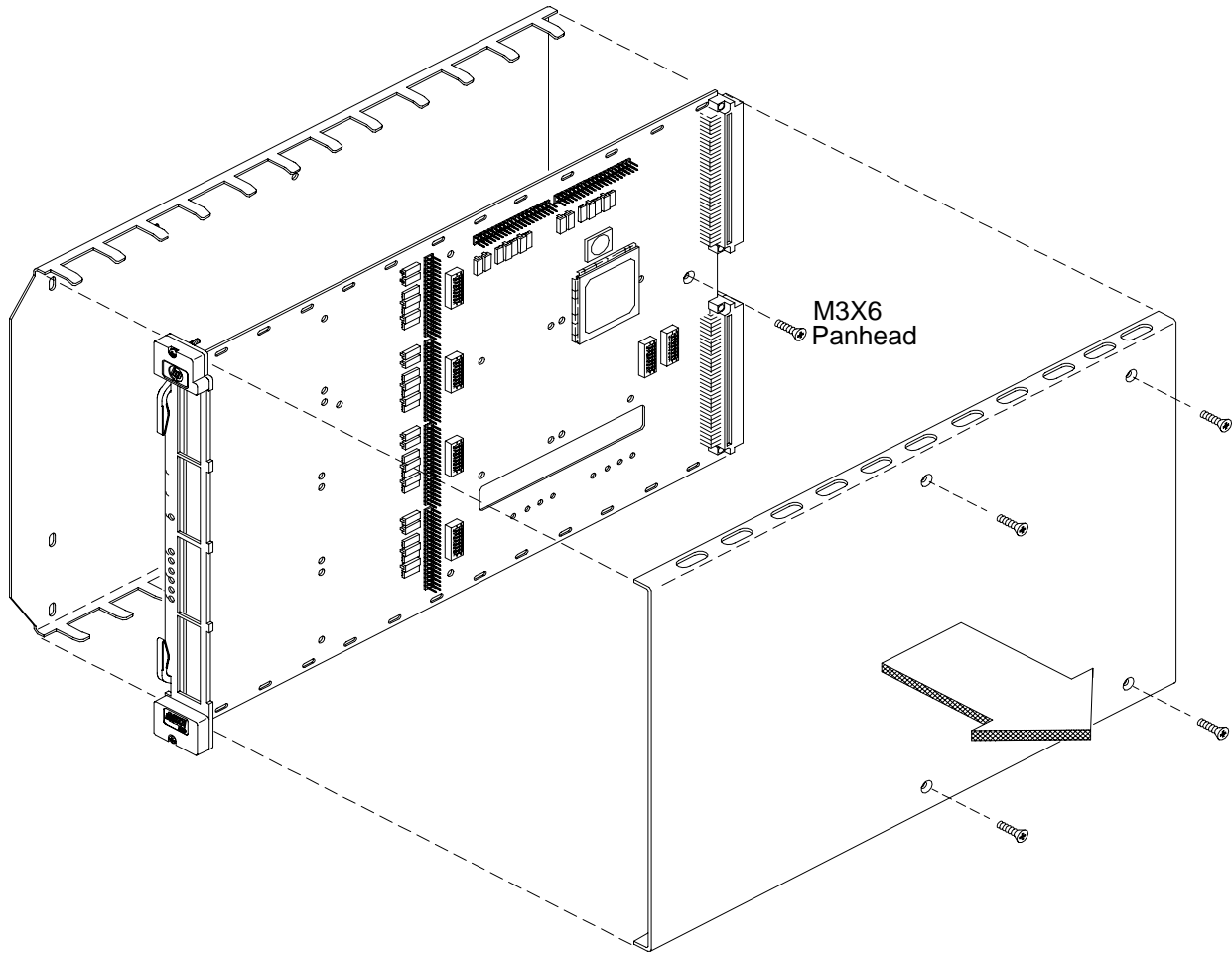
Caution **STATIC ELECTRICITY.** Static electricity is a major cause of component failure. To prevent damage to the electrical components in the Carrier and the M-Modules, observe anti-static techniques when installing or removing an M-Module from the Carrier or installing or removing the Carrier from the VXI mainframe.

Caution Modules in Carrier slot M5 are restricted to 60Vdc, 30Vac_{rms}, or 42Vac_{pk}.

Caution Remove all packing material before installing Carrier in VXI mainframe.

Step 1. Remove the Carrier Shields

1. Remove the four screws securing the Carrier top and bottom shield.
2. Remove the screw securing the PC board to the bottom shield.
3. Set the screws and shields aside for later re-assembly (Step 6).

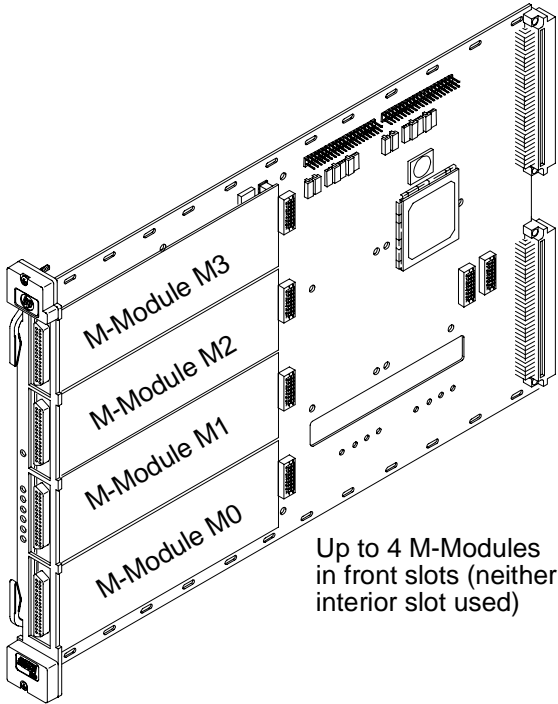


Note

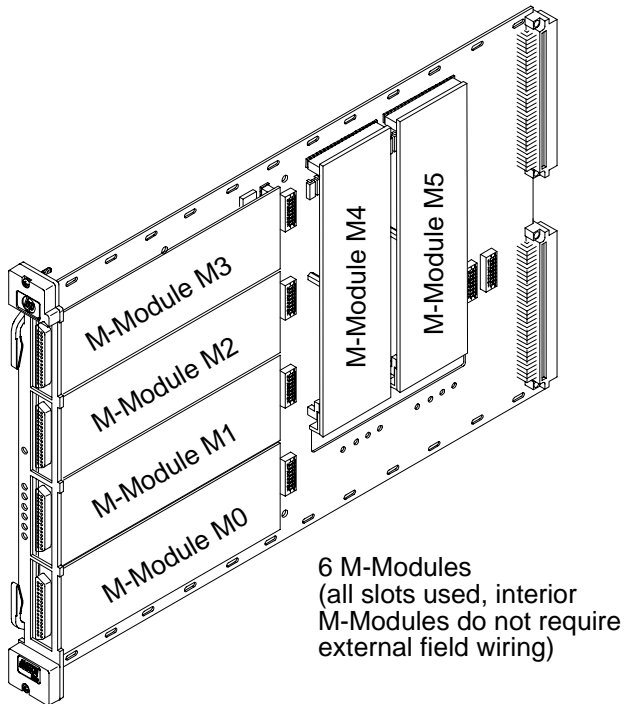
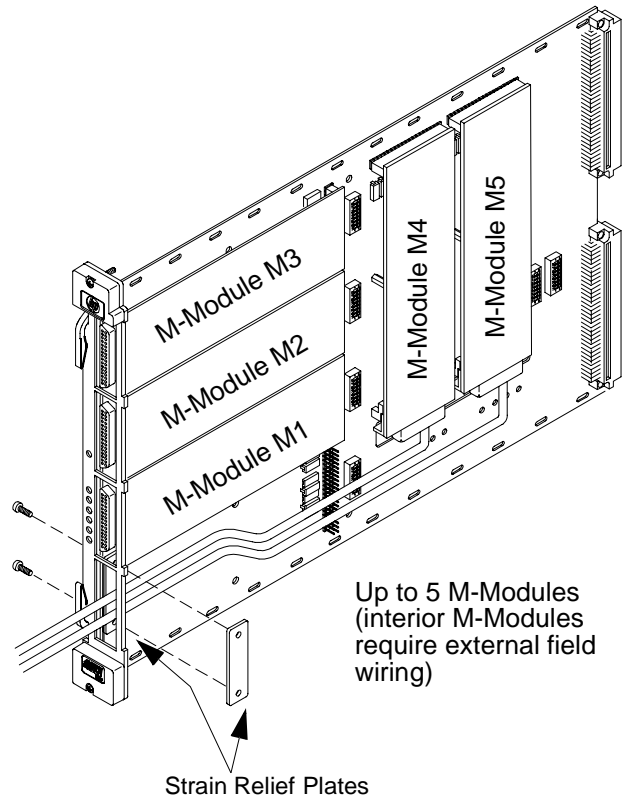
Some earlier carriers did not have the screw securing the PC board to the bottom shield. Instead, they had a fifth screw securing the top and bottom shields. Remove all five screws to disassemble the Carrier.

Step 2. Determine M-Module Layout

1. Identify the positions your M-Modules will occupy in the E2251A Carrier. The Carrier can hold up to six M-Modules only if neither of the modules in the two interior slots (M4 & M5) require external cabling. If one or both interior modules require external cabling, the bottom-front slot (M0) must be left unused to accommodate the wiring; strain relief clamps are provided. The following figure shows the common M-Module layouts.



CAUTION: Modules in Carrier slot M5 are restricted to 60Vdc, 30Vac_{rms}, or 42Vac_{pk}.



Step 3. Set the Logical Address for each M-Module

Each VXI module or M-Module in a VXI system must have a unique logical address. The logical address is used by the VXI resource manager to identify instruments. When the logical address of a module is set to a direct multiple of 8 (such as 8, 16, 24, ... 256), that module is considered an “instrument”.

An instrument's secondary address (used to program the module from GPIB) is derived by dividing the instrument logical address by 8. For example, a logical address of 24 is a secondary address of 03.

Guidelines for Determining Logical Addresses

The E2251A comes from the factory with the M-Module logical address switches set to 0.¹ In the E2251A M-Module Carrier, logical address 0 instructs the Carrier to ignore that slot and the Carrier does not report it to the VXI system resource manager.

You must set the logical address switches for each M-Module installed in the E2251A Carrier.

If you are using an E1406 Command Module set M-Module addresses to a multiple of 8 (i.e., 8, 16, 24, 32, . . . 256). Do not set any M-Module logical address to the same value as any other M-Module or any other VXI module in the system. You can use up to 31 M-Modules (up to seven Carriers) with an E1406 Command Module or 255 M-Modules (up to 51 Carriers) with embedded controllers, VXLink, or MXIbus controllers.

Note

Multiple-module Scanning Voltmeter or Switchbox instruments are not supported with M-Modules on the E2251A Carrier. Multiple-module instruments can only be created using standard B- or C-size VXI modules.

Unused Slots on the Carrier

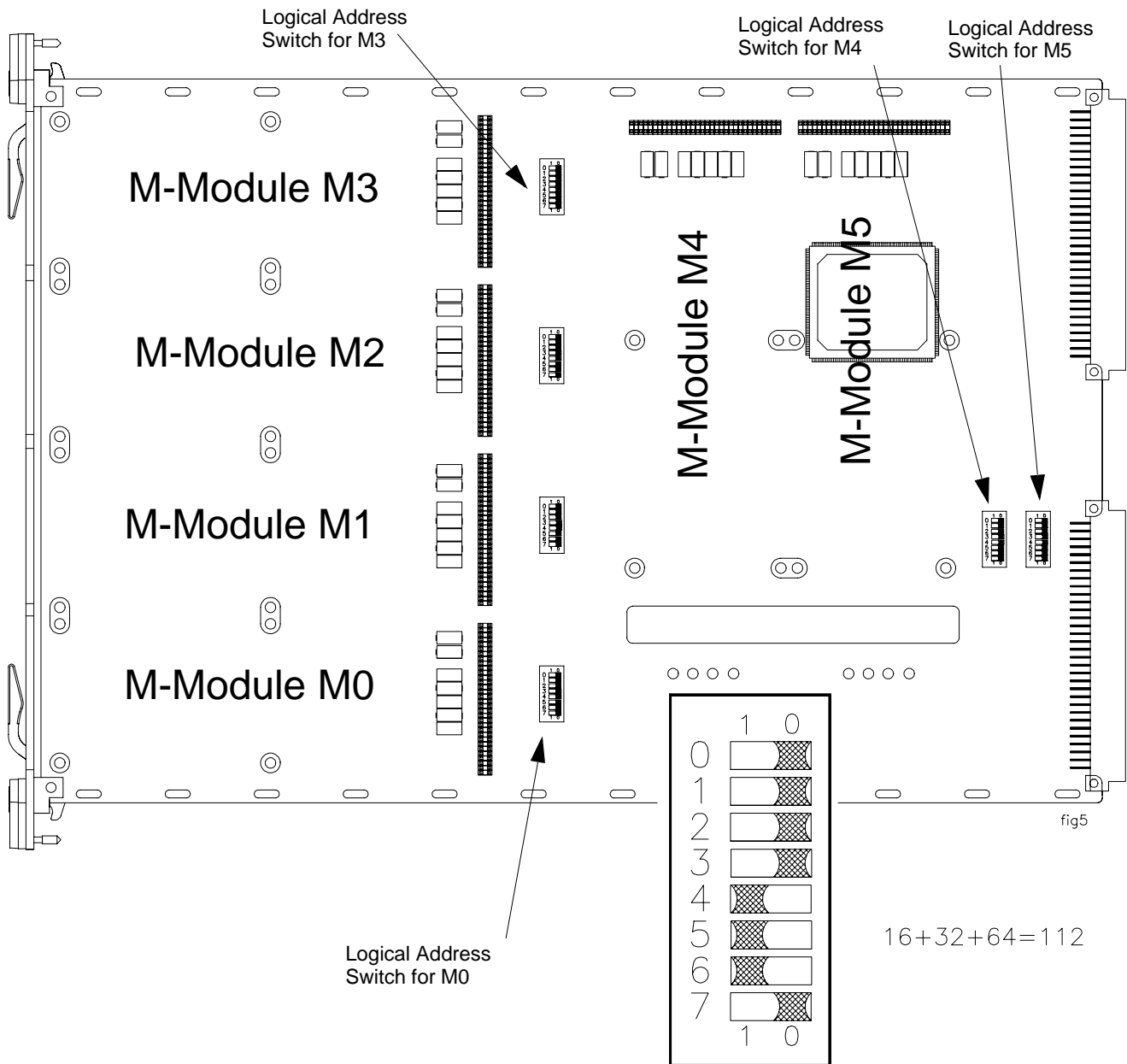
Unused slots on the E2251A Carrier should have their logical address set to 0 (zero). With the logical address set to 0, the Carrier disables the circuits (interrupt, reserved memory, etc.) for that slot.

1. Note that in a standard VXI system, logical address 0 is reserved for the VXIbus command module / resource manager. On the E2251A Carrier however, logical address 0 causes the Carrier to disregard that M-Module slot.

Setting the Addresses

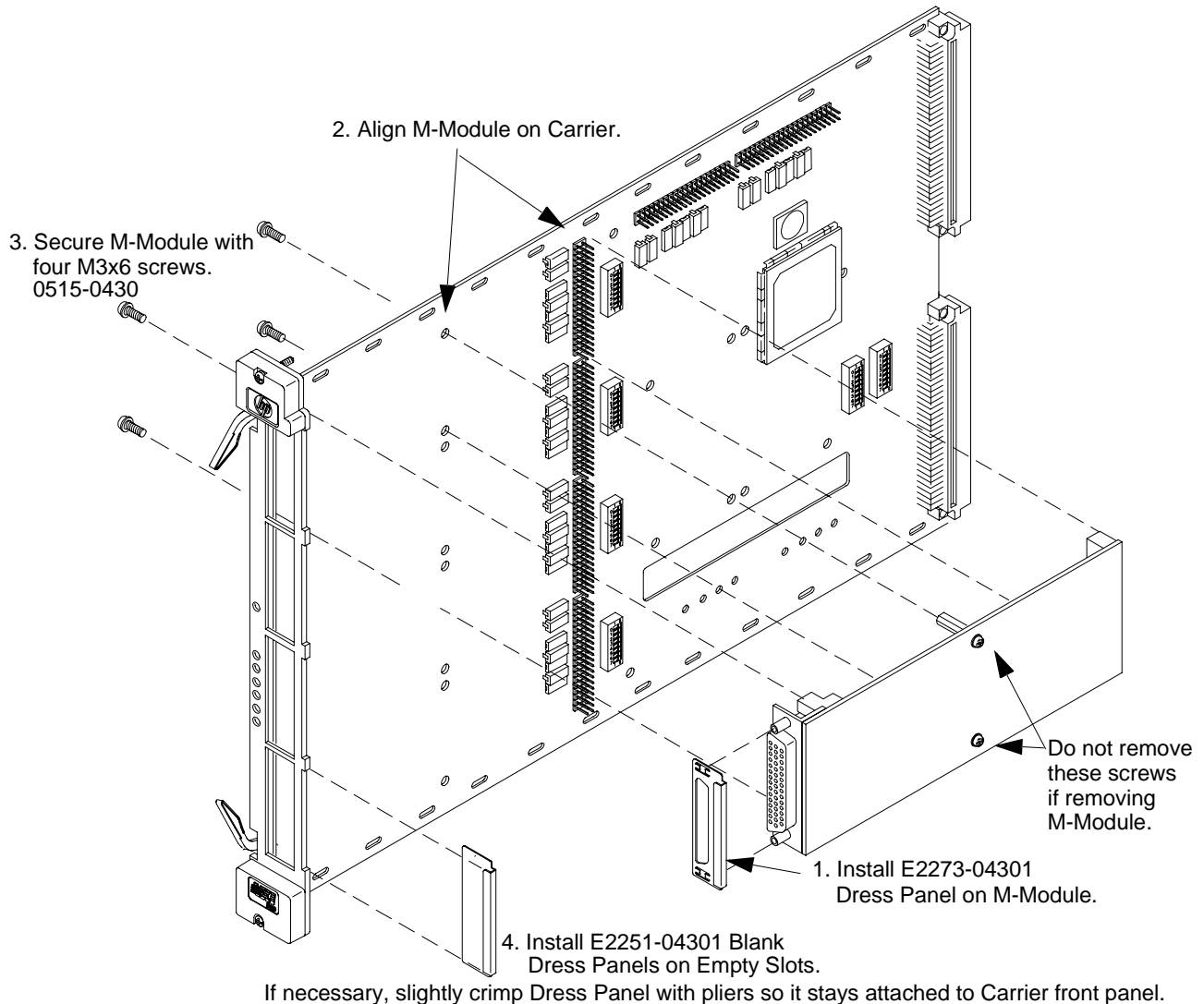
As shown below, the E2251A has six logical address switch banks, one for each M-Module slot. **You must set the logical address switches for each M-Module installed in the E2251A Carrier.**

A logical address switch bank contains eight individual switches. To determine the logical address, add together the decimal values of the switches that are set (position 1 = set, 0 = not set). For example, in the figure below, switches 4, 5, and 6 are set, the other switches are not set. The logical address is the sum of the decimal values of the set switches: $16 + 32 + 64 = 112$.



Step 4. Install M-Modules onto the Carrier

1. For internally-mounted M-Modules (slots M4 and M5) see Step 5, next page.
2. Install RFI Dress Panel (p.n. E2273-04301) on each of the front mounted M-Modules. Dress panels act like a gasket and minimize RFI. Make certain the M-Module-to-Carrier connectors line up properly. Make certain the M-Module standoffs are aligned over the screw mounting holes.
3. Secure each M-Module to the Carrier (from the back side) with four M3x5 mounting screws (p.n. 0515-0372, with captive lock washer) supplied with M-Module. Open handles on Carrier to install screws for slots M0 and M3 M-Modules.
4. Install blank Dress Panel (p.n. E2251-04301) over each unused front panel slot to minimize RFI.



Caution Static Electricity. Use anti-static techniques when installing/removing M-Module.

Use care when installing M-Modules onto the carrier connectors. The Carrier and M-Module connectors ARE NOT keyed; it is possible to misalign an M-Module and connect it to the wrong connectors. APPLYING POWER TO A MISALIGNED M-MODULE WILL DAMAGE OR DESTROY THE M-MODULE AND THE CARRIER.

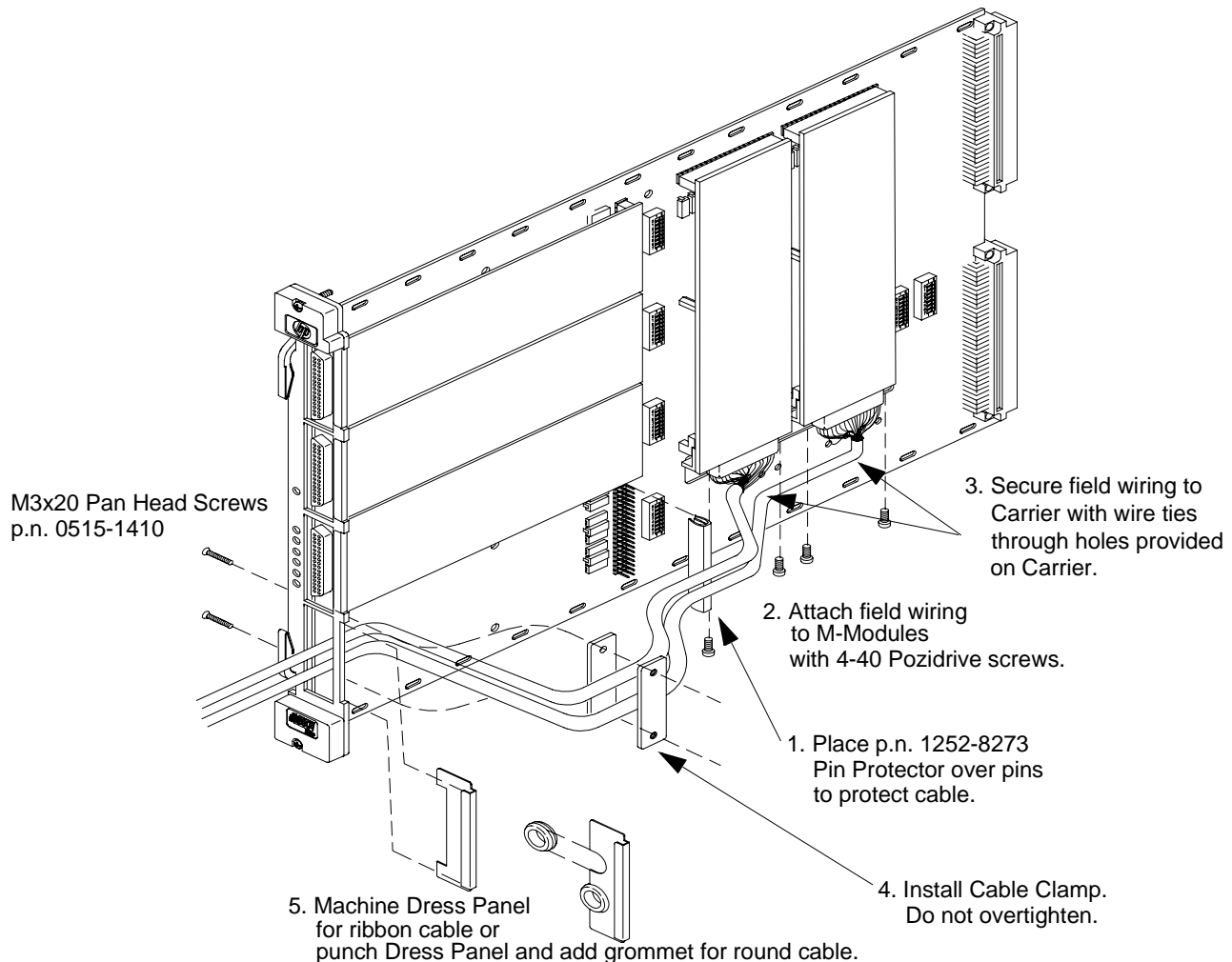
Step 5. Connect Field Wiring to Slot M4 & M5 M-Modules

If you installed M-Modules on either or both of the interior slots, the following instructions describe how to secure the field wiring. If you did not install an M-Module in slots M4 or M5, skip this page and go to Step 6.

1. Cover the M0 2-row connector strip with provided Pin Protector/Cover (p.n. 1252-8273). This pin protector protects the field wiring from chafing against the connector pins.

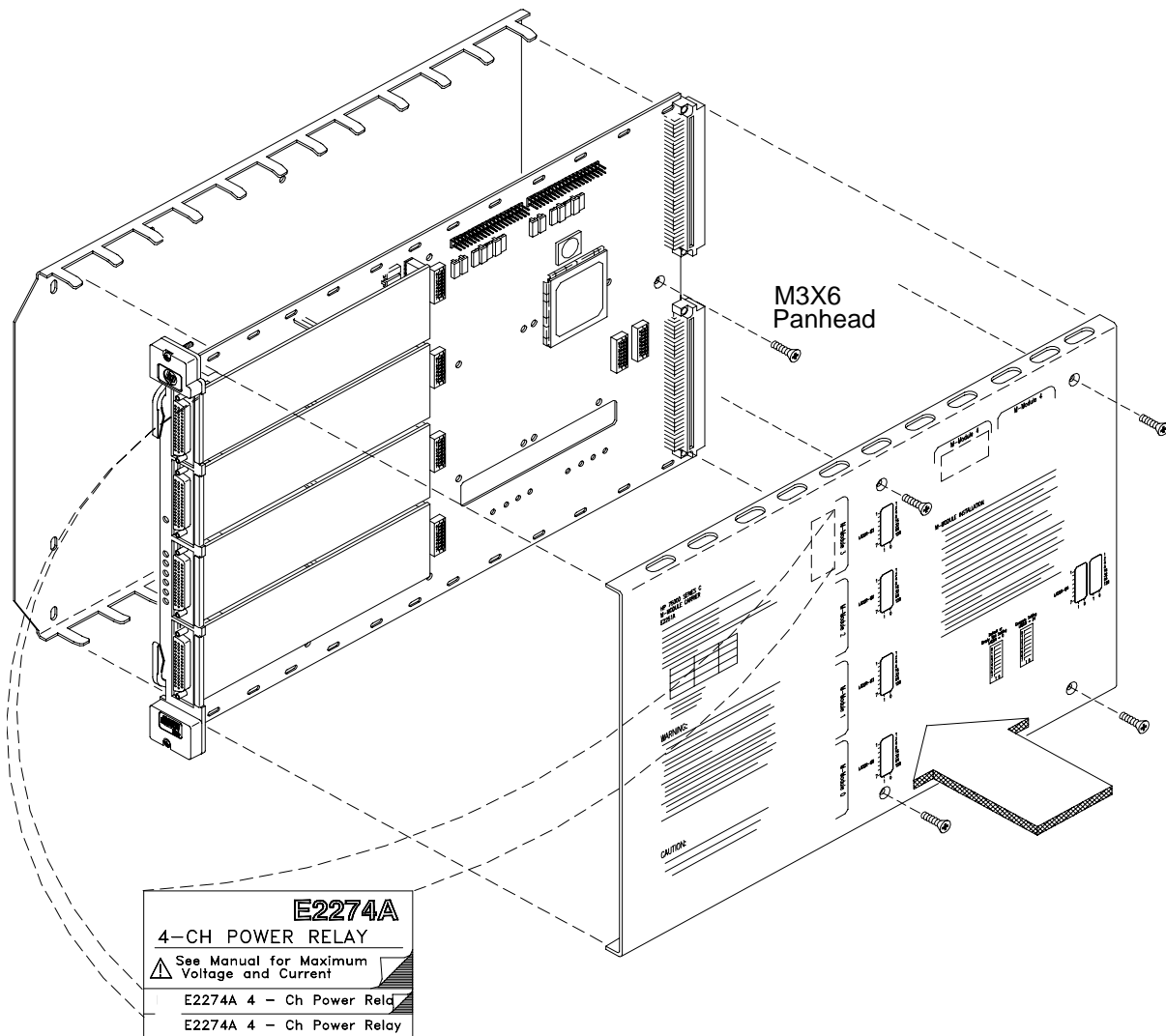
Note: Do not install the plastic cable hood (see page 21) on the field wiring connectors for the two internal M-Modules. Do not install the RFI dress panels on the two interior M-Modules. If an RFI dress panel is already installed on an M-Module, it must be removed. They are not needed and may interfere with installation of the top shield.

2. Holes are provided in the Carrier for cable ties to secure the field wiring cables.
3. Install cable clamp plates (p.n. E2251-01203) on top side of PC board. Secure the cable clamp (but do not overtighten). Both clamps are required to prevent damage to PC board.
4. To minimize RFI, install a dress panel (p.n. E2251-04301) over the front panel M0 slot position. Have the dress panel machined or punched to allow the cable to pass through. Machine the cut as small as possible; large enough for the cable and optional grommet (to prevent chafing) but tight to minimize RFI.



Step 6. Reattach the Carrier Shields

1. Carefully place the PC board on the bottom Carrier shield. Align the mounting holes and secure with the mounting screw.
2. For modules mounted in the interior slots (M4 & M5), make certain their field wiring is not pinched.
3. Position the top shield and align the mounting holes. Install four screws securing the top and bottom shields.
4. Attach supplied M-Module labels to the Carrier top shield and the RFI Dress Panel to identify M-Module installed in the Carrier.



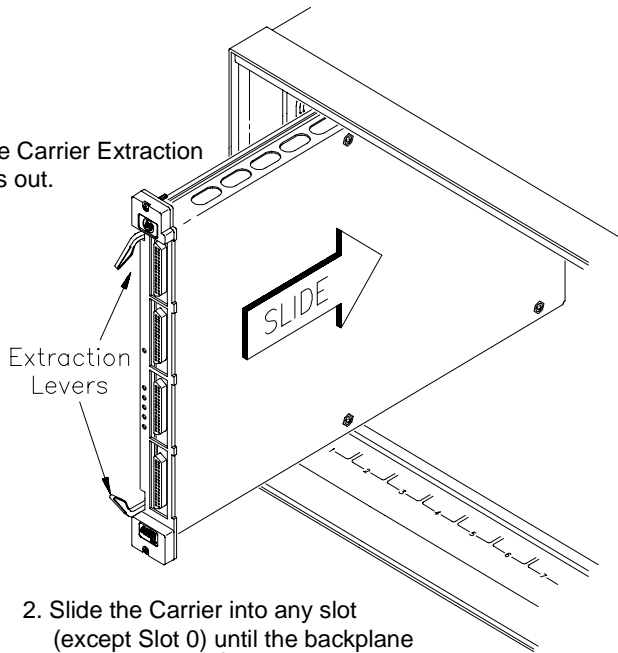
Note

Some earlier carriers did not have the screw securing the PC board to the bottom shield. Instead, they had a fifth screw securing the top and bottom shields. Remove all five screws to disassemble the Carrier.

Step 7. Install Carrier into C-Size VXI Mainframe

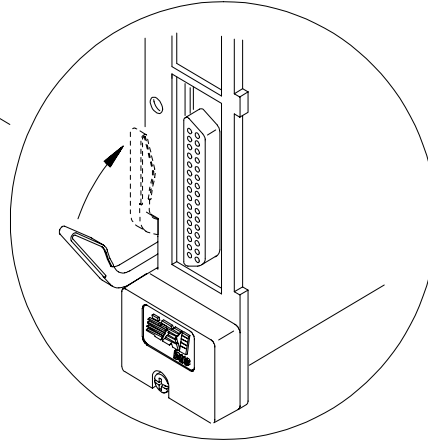
WARNING To avoid possible electrical shock, make certain that power is removed from the VXI mainframe, all field wiring, and external devices connected to the VXI mainframe.

1. Set the Carrier Extraction Levers out.



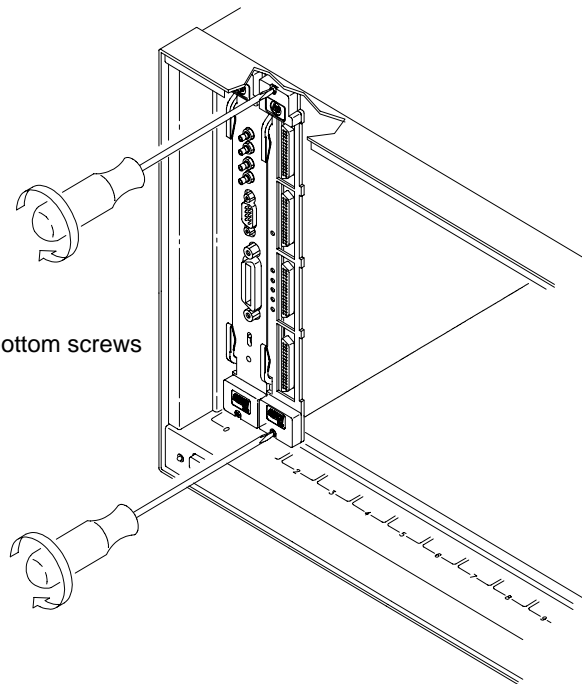
2. Slide the Carrier into any slot (except Slot 0) until the backplane connectors touch.

3. Seat the Carrier into the mainframe by pushing in the extraction levers.



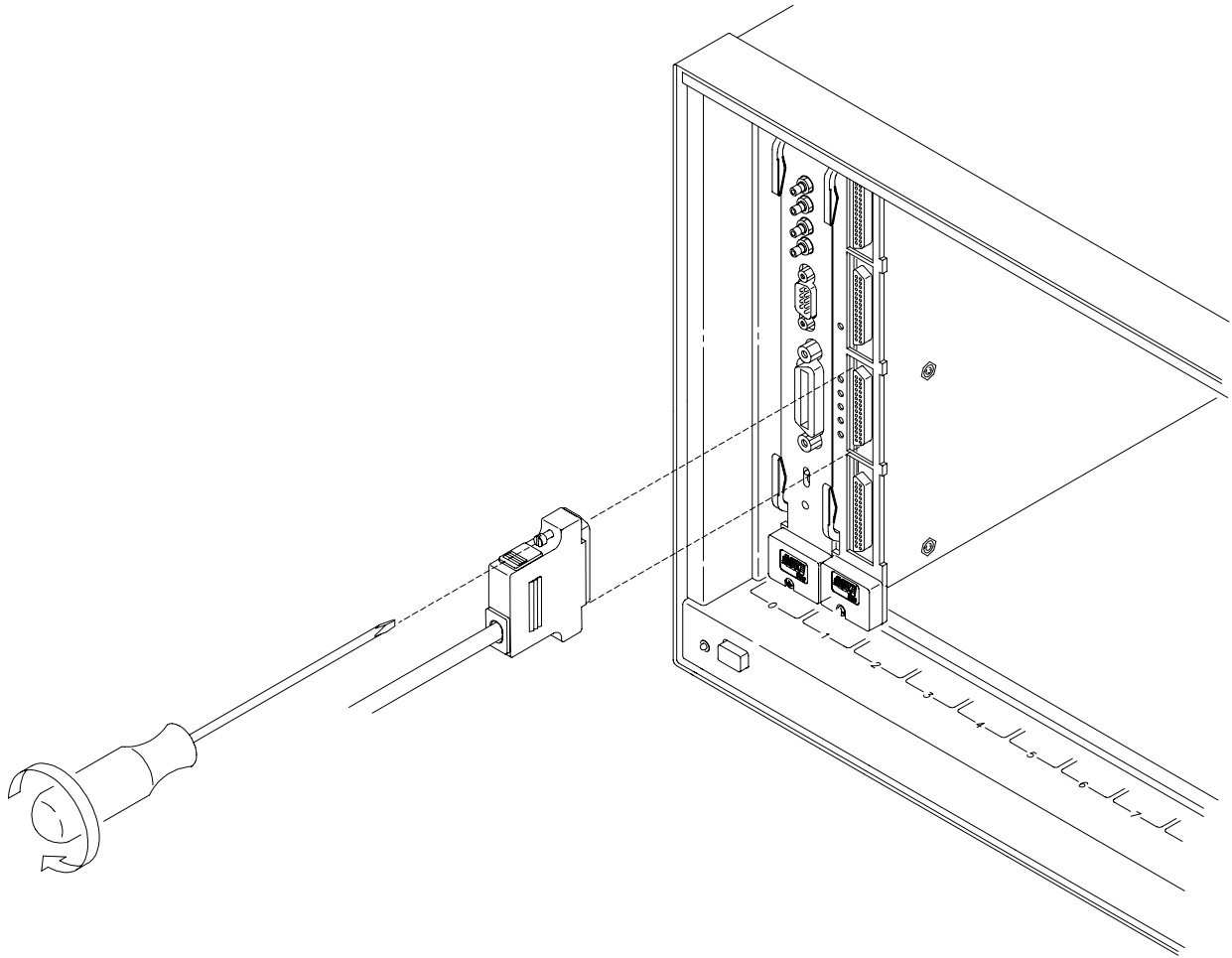
Note: Do not push on the front panel of the E2251A Carrier. Doing so may bend the front panel.

4. Tighten the top and bottom screws to secure the Carrier to the mainframe.



Step 8. Connect Field Wiring to Front M-Modules

1. Refer to “Assembling the M-Module Field Wiring Connector” on page 21 for information on assembling the connector and hood.
2. Attach assembled connector to M-Modules.
3. Tighten mounting screws to secure connector to the M-Module.



Step 9. Installation / Operational Verification

1. Turn on the VXI mainframe and use the *VXIplug&play* Soft Front Panels (SFP) to verify installation and operation of the M-Modules. The SFPs are supplied on the CD ROM accompanying your M-Modules and Carrier. The SFP is an MS Windows® application that allows you to program an instrument or M-Module over GP-IB or from an embedded controller. For systems with a GPIB-VXI Command Module, such as the E1406, connect a GPIB cable between the computer's I/O interface and the Command Module. If the instrument is not available, you can still run the SFP with 'live mode' disabled. Start the SFP by selecting the LOGO and instrument name in the VXIpn program group. Online help is available with the SFP.

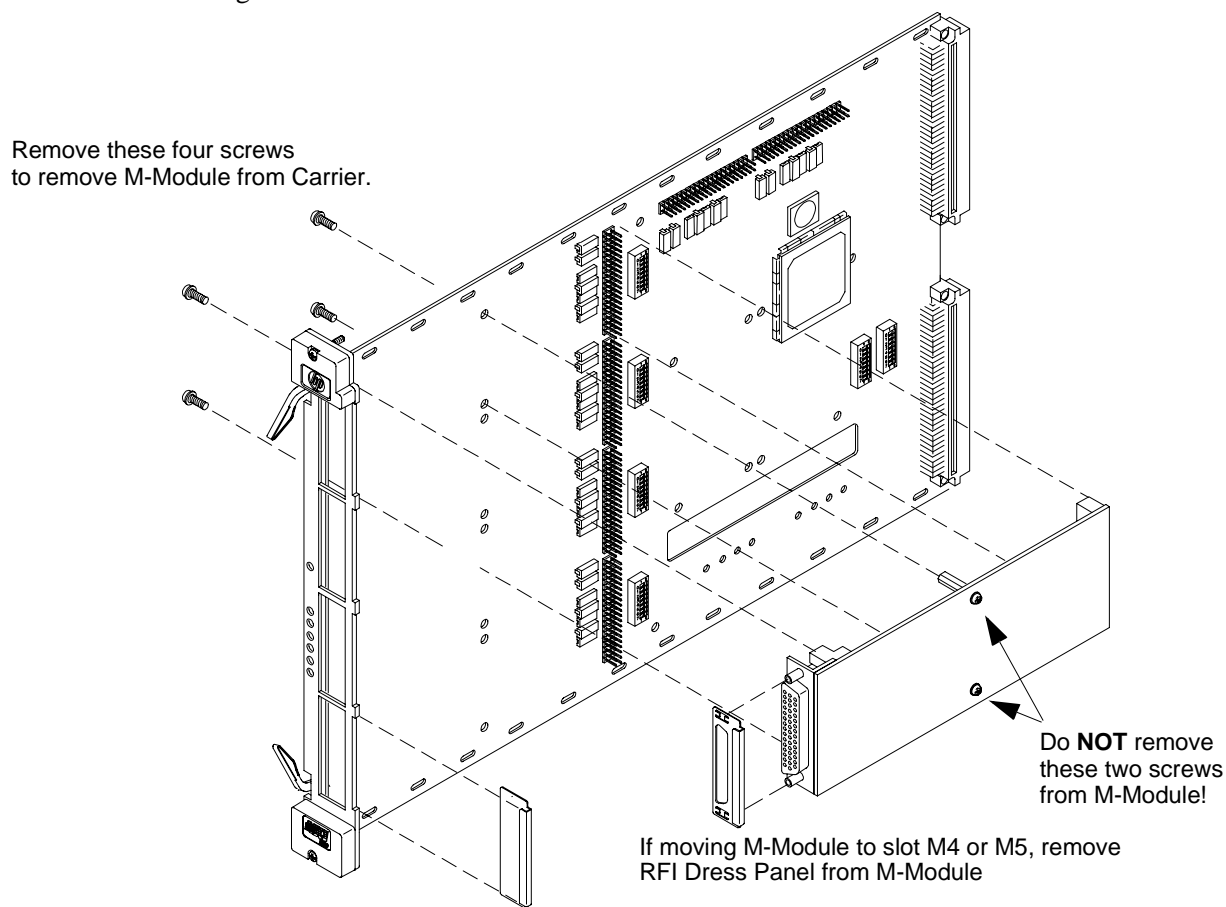
You Are Done

This concludes the M-Module Installation, Configuration, and Wiring procedures for the E2251A M-Module Carrier. For Operating and Programming information refer to the E2251A M-Module Carrier User's Manual. For information about specific M-Modules, refer to the respective M-Module User's Manual.

Removing M-Modules from the Carrier

WARNING To avoid possible hazardous electrical shock, remove power from the VXI Mainframe, all field wiring, and external devices connected to the VXI mainframe.

1. Remove all field wiring connectors from the front-mounted M-Modules of the E2251A. Refer to “Step 8. Connect Field Wiring to Front M-Modules” on page 18 for general guidelines.
2. Remove the Carrier from the VXI Mainframe. Open the extraction levers to release the Carrier from the mainframe. Refer to “Step 7. Install Carrier into C-Size VXI Mainframe” on page 17 for general guidelines.
3. Follow instructions in “Step 1. Remove the Carrier Shields” on page 10 of this manual to remove the top and bottom shields from the Carrier.
4. Refer to the figure below to remove M-Modules from the Carrier.



Caution **STATIC ELECTRICITY.** Static electricity is a major cause of component failure. To prevent damage to the electrical components in the Carrier and the M-Modules, observe anti-static techniques when installing or removing an M-Module from the Carrier or installing or removing the Carrier from the VXI mainframe.

M-Module Field Wiring Information

The following section provides a brief, summary of the field wiring for each Hewlett-Packard M-module. It includes a connector pin-out table, a simplified schematic, and a connector drawing. For additional information about a specific M-Module, refer to the respective M-Module's User's Manual.

Caution Do not exceed the voltage and current specifications for the individual modules.

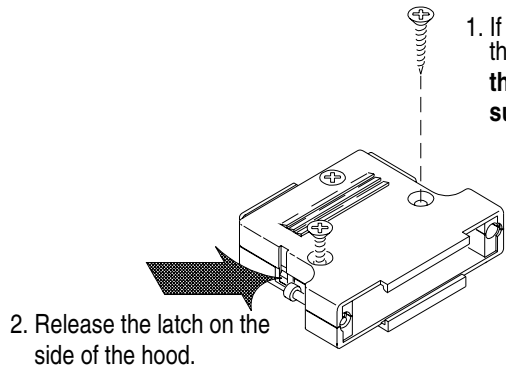
Caution All installation, wiring, and configuration procedures are to be done with power **DISCONNECTED** from the VXI mainframe and power **DISCONNECTED** from any external wiring/cabling.

WARNING To prevent electric shock, tighten all faceplate and mounting screws when installing M-Modules on the Carrier and the field wiring connector mounting screws.

Assembling the M-Module Field Wiring Connector

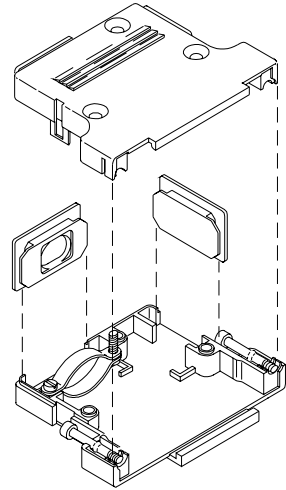
Most M-Modules come supplied with a 44-pin connector and matching hood with strain relief (kit part number E2251-01203). You must supply your own cable. The figure on the next page shows how to assemble the connector and hood.

Note Do not assemble the hood to the connector for the two internally-mounted M-Modules. Strain relief can be provided by wire ties through holes in the Carrier.

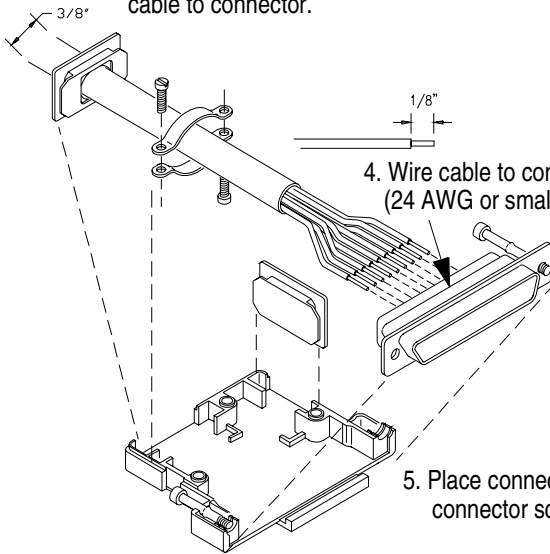


1. If necessary, disassemble the connector hood. **Discard the three self-tapping screws supplied with the hood.**

2. Release the latch on the side of the hood.

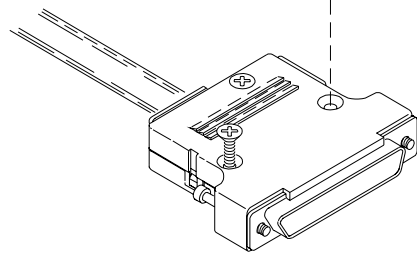


3. Assemble bezel and cable clamp before wiring cable to connector.

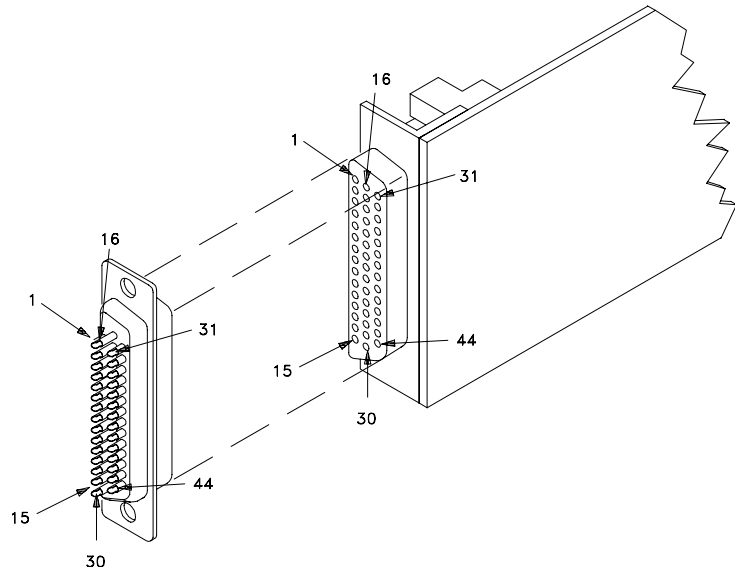


4. Wire cable to connector. (24 AWG or smaller)

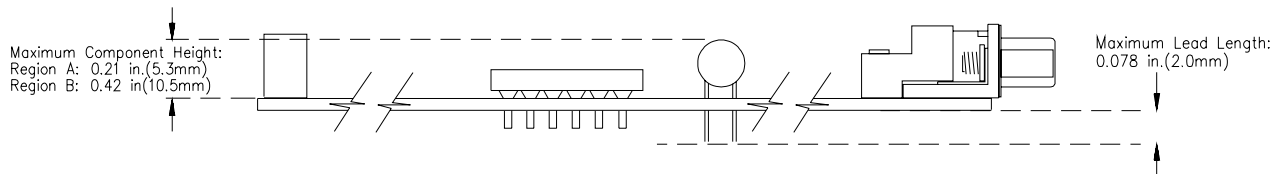
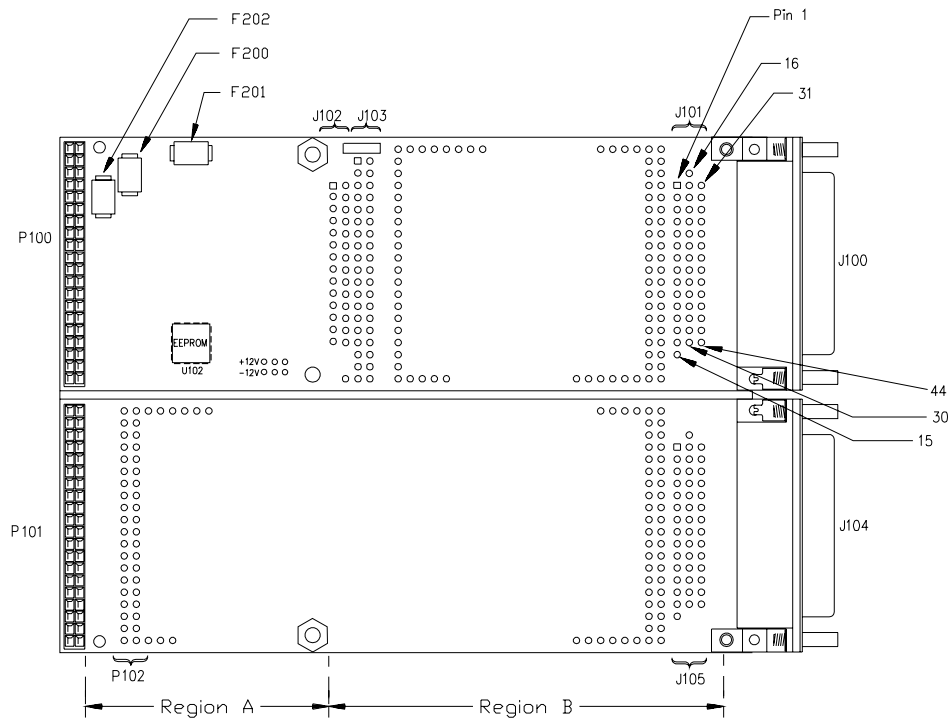
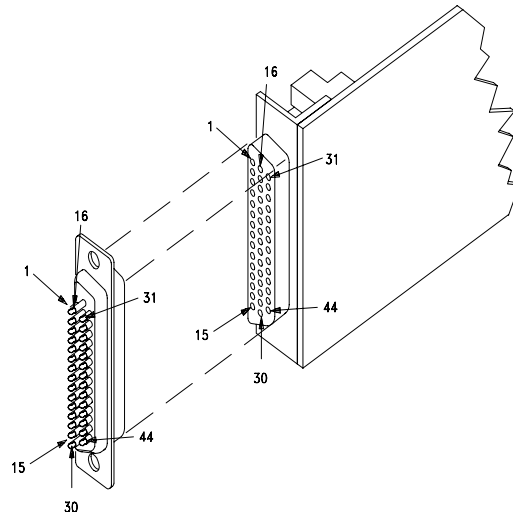
6. Assemble connector, cable strain relief, and hood. Use the supplied M3x12 machine screws.



5. Place connector and connector screws on bottom shell.



E2259A Double-Wide Breadboard M-Module Wiring Information



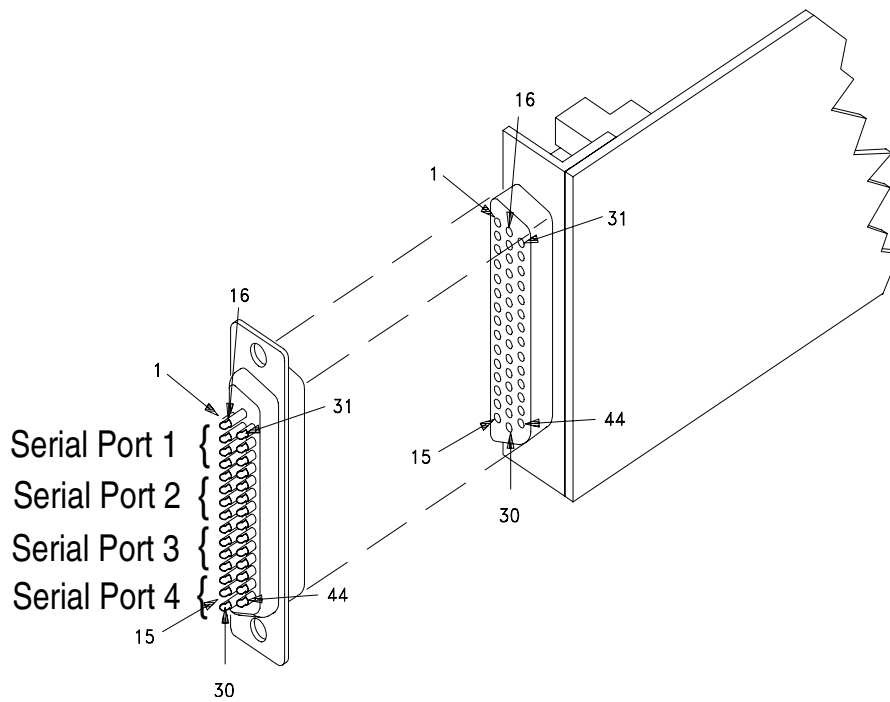
E2259A
J102 Pinout Table

Description	Pin Number	Pin Number	Description
RP7	1	2	RP6
RP5	3	4	RP4
RP3	5	6	RP2
RP1	7	8	RP0
WP7	9	10	WP6
WP5	11	12	WP4
WP3	13	14	WP2
WP1	15	16	WP0
Busy*	17	18	+5V dc
CRST	19	20	+5V dc
LAT*	21	22	+5V dc
EINT*	23	24	GND
CRST*	25	26	GND
DBEN*	27	28	GND

E2259A
J103 Pinout Table

Description	Pin Number	Pin Number	Description
TR0	1	2	TR1
TR2	3	4	TR3
TR4	5	6	TR5
TR6	7	8	TR7
TR8	9	10	TR9
TR10	11	12	TR11
TR12	13	14	TR13
TR14	15	16	TR15
BC0	17	18	BC1
BC2	19	20	BC3
BC4	21	22	BC5
BC6	23	24	BC7
BC8	25	26	BC9
BC10	27	28	BC11
BC12	29	30	BC13
BC14	31	32	BC15
GND	33	34	GDN
Chassis GND	35	36	Chassis GND

E2261A Quad RS-232 Interface Wiring Information

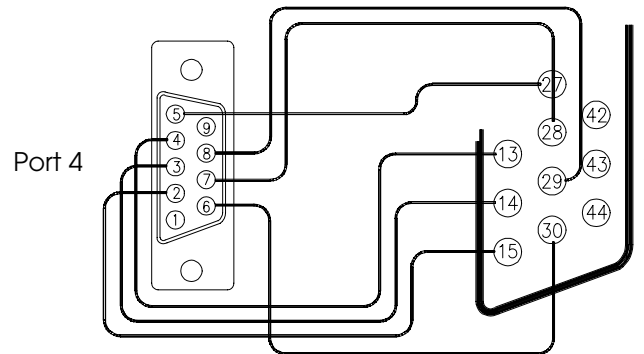
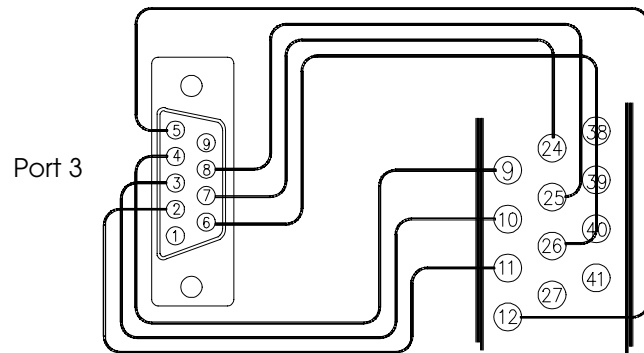
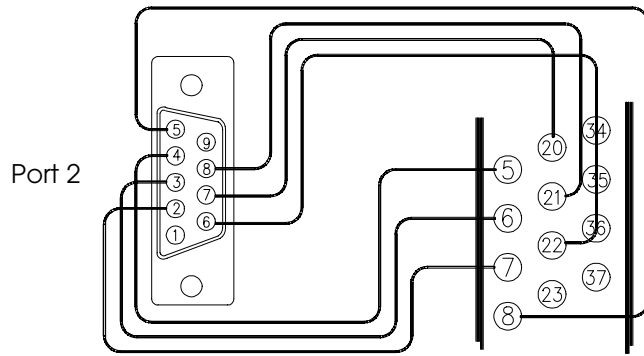
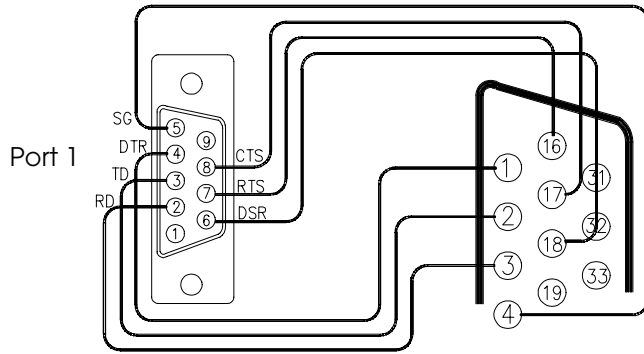


HP E2261A Quad Serial M-Module Pin Name and Function		Port 1 Pin #s	Port 2 Pin #s	Port 3 Pin #s	Port 4 Pin #s	9-Pin Connector Pin #
DTR	Data Terminal Ready	1	5	9	13	4
TD	Transmitted Data	2	6	10	14	3
RD	Received Data	3	7	11	15	2
RTS	Request to Send	16	20	24	28	7
CTS	Clear to Send	17	21	25	29	8
DSR	Data Set Ready	18	22	26	30	6
SG	Signal Ground	4, 8, 12, 19, 23, 27				5
	Chassis Connection ^a	31, 32, 33, . . . 43, 44				-

a. If you use a shielded cable, connect the shield to a chassis connector pin on the 44-pin connector. Do not connect the other end of the shield.

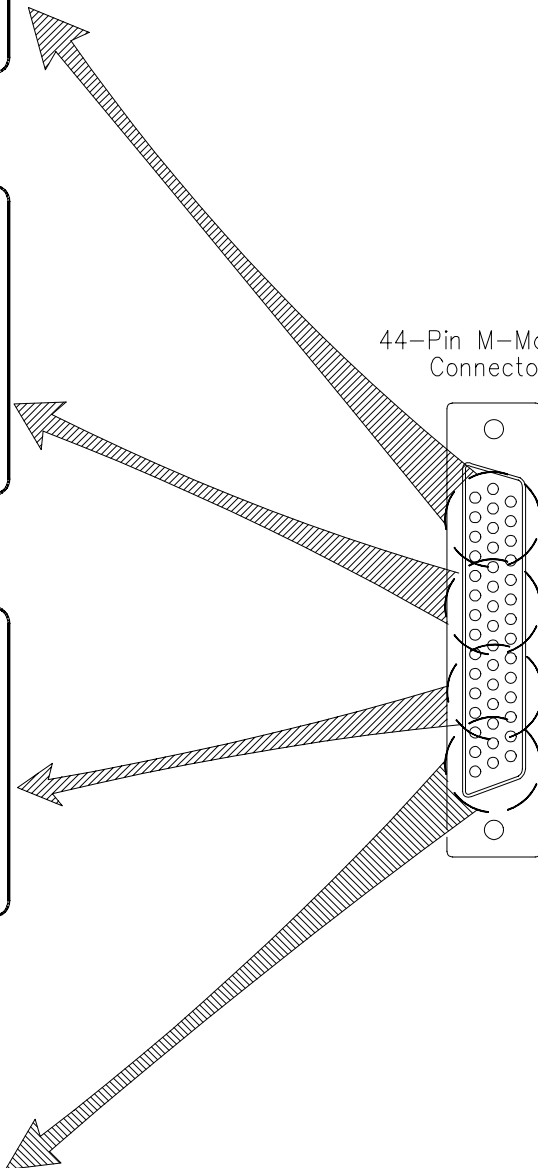
Note: If you use the optional E2261-61601 cable, you must remove the cable hood if you install the E2261A in either of the two internal slots of the E2251A Carrier. The figure on the next page shows the cable wiring for making your own cable.

9-Pin (male)
Connector

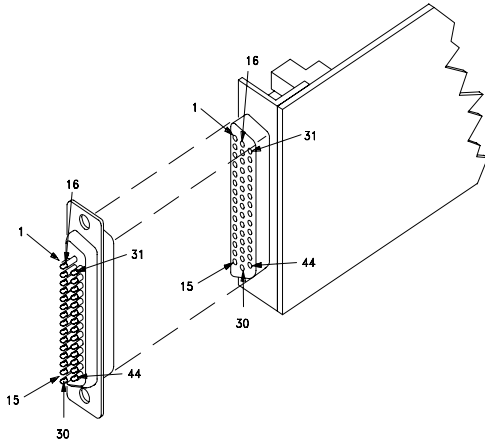


Note: If you are using shielded cable, connect the shield to pins 31 - 44 on the 44-pin M-Module connector only. This connects the shield to the VXI chassis (earth ground).

44-Pin M-Module
Connector



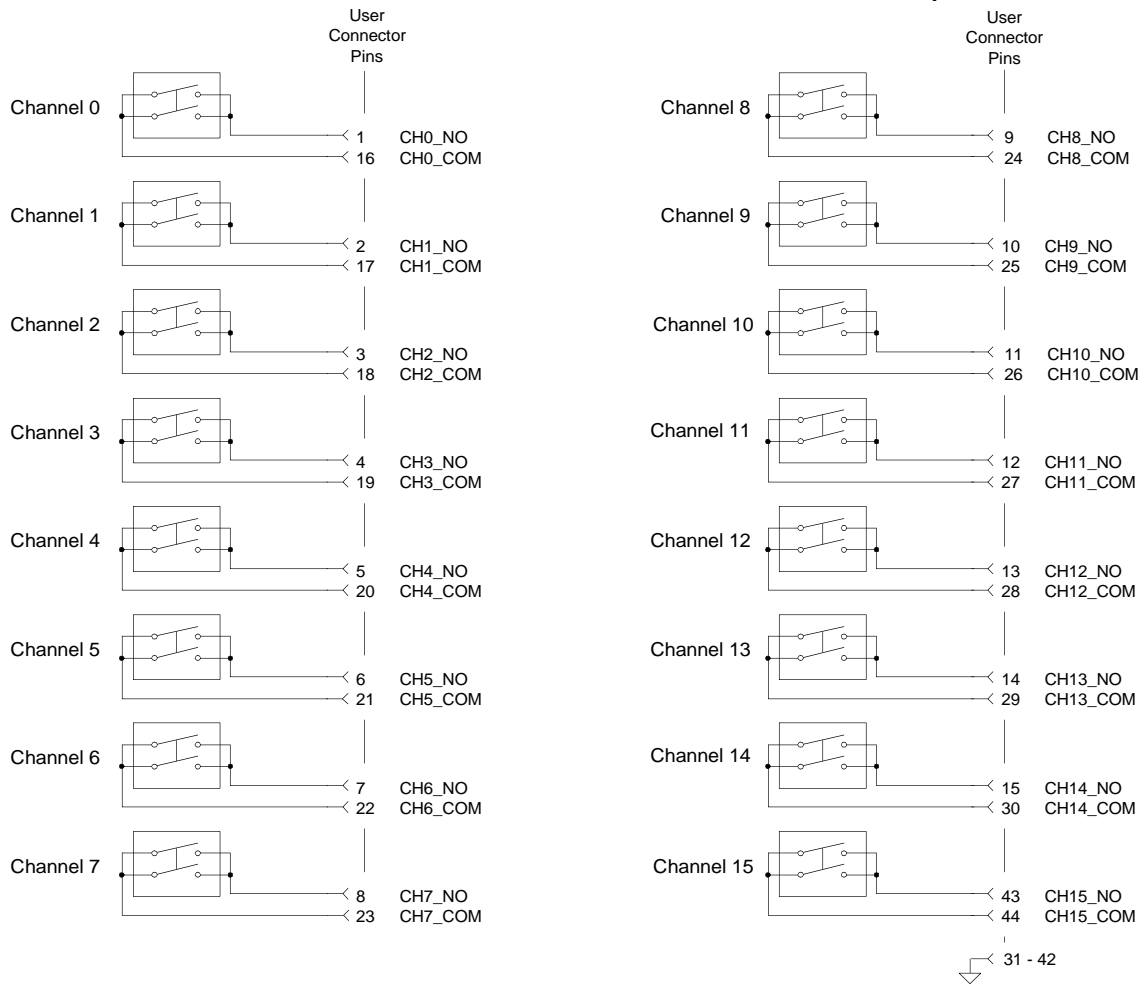
E2270A 16-Channel Form A Switch Wiring Information



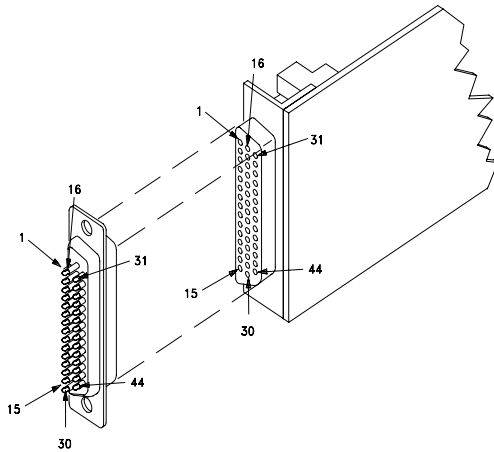
MAXIMUM VOLTAGE/CURRENT: The maximum voltage that may be applied to any connector on the E2270A, E2271A, or E2272A is 200 VDC, 125 VAC rms, or 175 VAC peak. These limits apply only if the product is installed in a humidity-controlled (<60% RH) environment where airborne contaminants and transients are controlled, and there is NOT a relay connection made to power mains. If these conditions CANNOT be maintained, then the maximum voltage is 60 VDC, 48 VAC rms or 68 VAC peak.

The maximum current (non-inductive) that may be applied to the E2270A, E2271A, or E2272A is:

- Per Switch: 2 ADC, 2 AAC peak
- Per M-Module: 8ADC, 8AAC peak

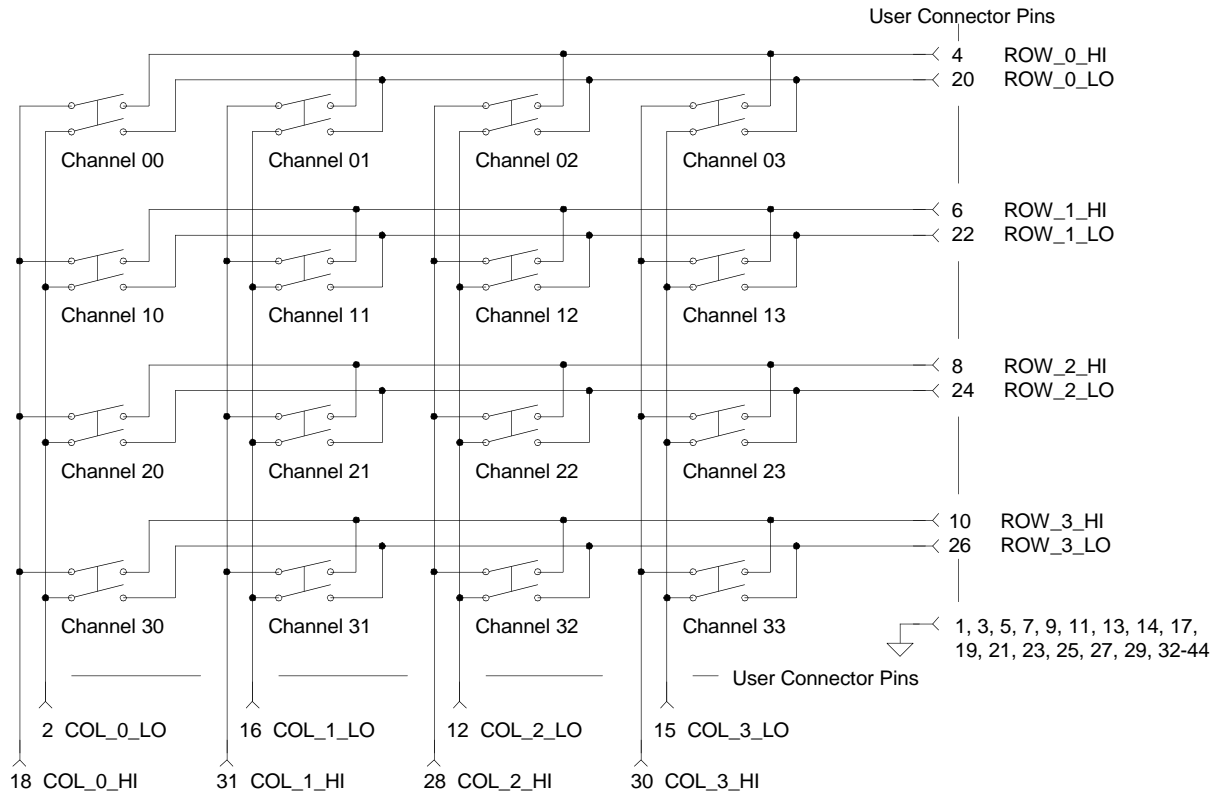


E2271A 4x4 Matrix Switch Wiring Information

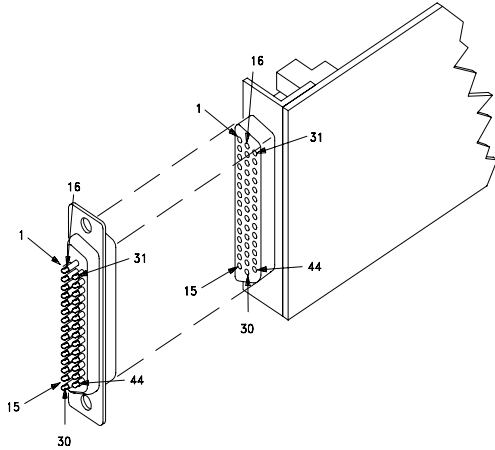


MAXIMUM VOLTAGE/CURRENT: The maximum voltage that may be applied to any connector on the E2270A, E2271A, or E2272A is 200 VDC, 125 VAC rms, or 175 VAC peak. These limits apply only if the product is installed in a humidity-controlled (<60% RH) environment where airborne contaminants and transients are controlled, and there is NOT a relay connection made to power mains. If these conditions CANNOT be maintained, then the maximum voltage is 60 VDC, 48 VAC rms or 68 VAC peak.

The maximum current (non-inductive) that may be applied to the E2270A, E2271A, or E2272A is:
Per Switch: 2 ADC, 2 AAC peak
Per M-Module: 8ADC, 8AAC peak



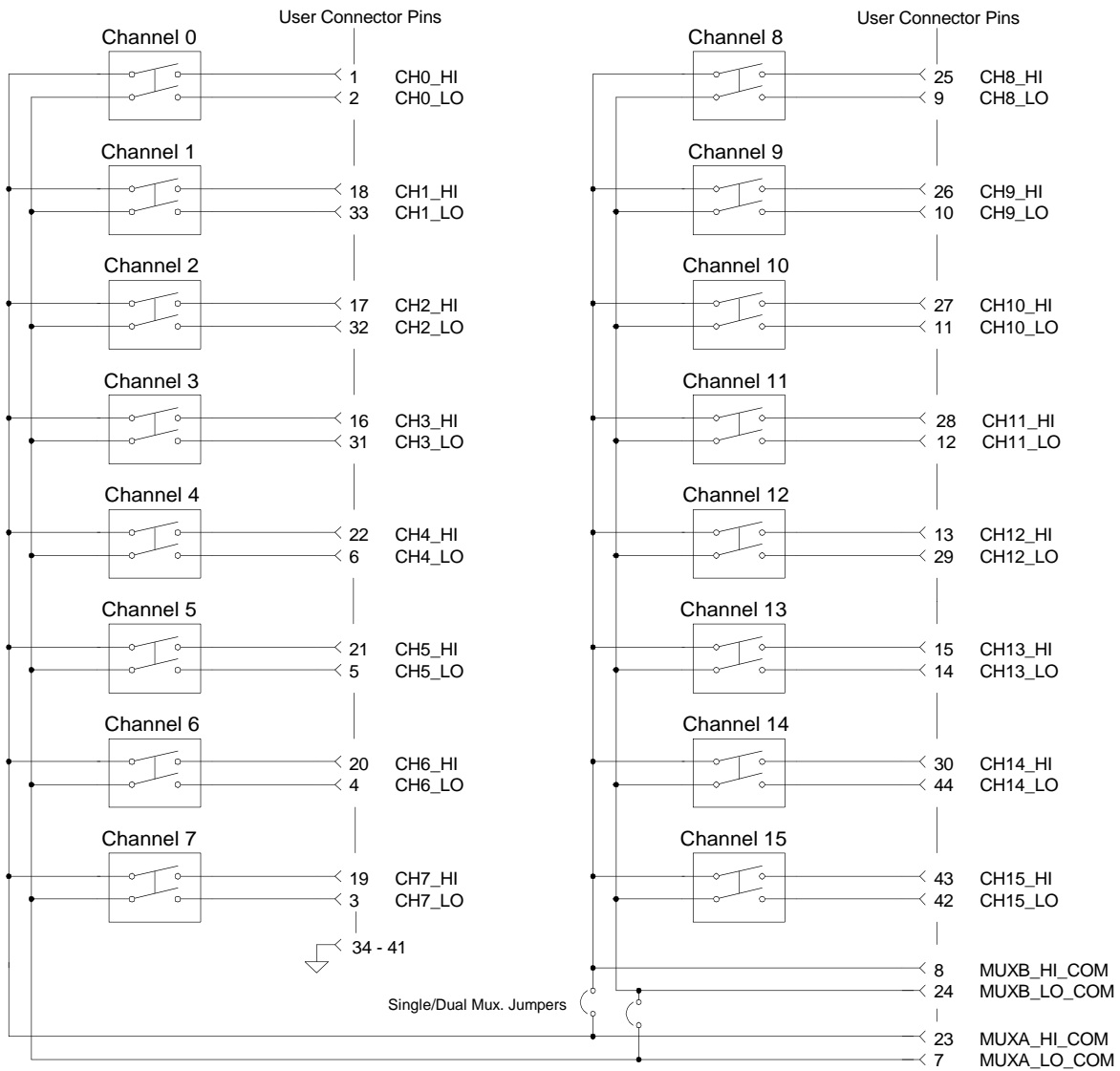
E2272A Dual 8-to-1/Single 16-to-1 Relay Multiplexer Wiring Information



MAXIMUM VOLTAGE/CURRENT: The maximum voltage that may be applied to any connector on the E2270A, E2271A, or E2272A is 200 VDC, 125 VAC rms, or 175 VAC peak. These limits apply only if the product is installed in a humidity-controlled (<60% RH) environment where airborne contaminants and transients are controlled, and there is NOT a relay connection made to power mains. If these conditions CANNOT be maintained, then the maximum voltage is 60 VDC, 48 VAC rms or 68 VAC peak.

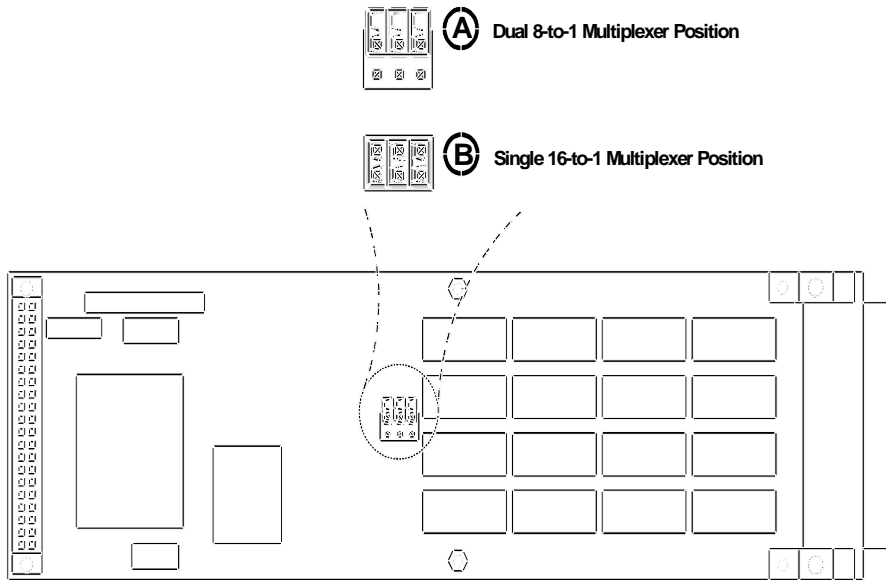
The maximum current (non-inductive) that may be applied to the E2270A, E2271A, or E2272A is:

- Per Switch: 2 ADC, 2 AAC peak
- Per M-Module: 8ADC, 8AAC peak

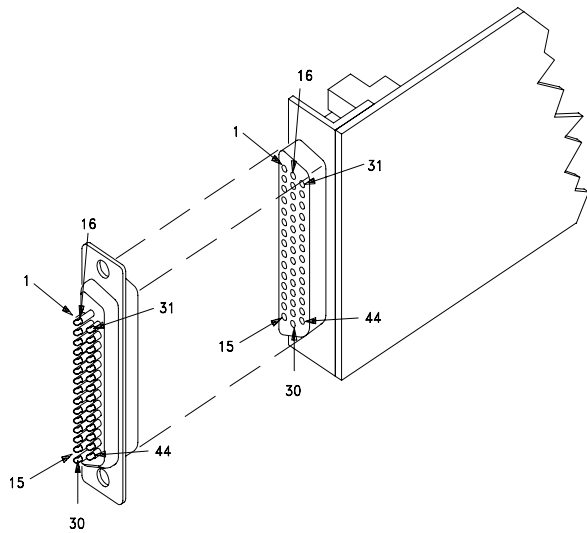


Configuring the E2272A

The following figure shows the two jumper positions for the E2272A. In position **A**, the M-Module is configured as a dual 8-to-1 multiplexer. In position **B**, the M-Module is configured as a single 16-to-1 multiplexer.

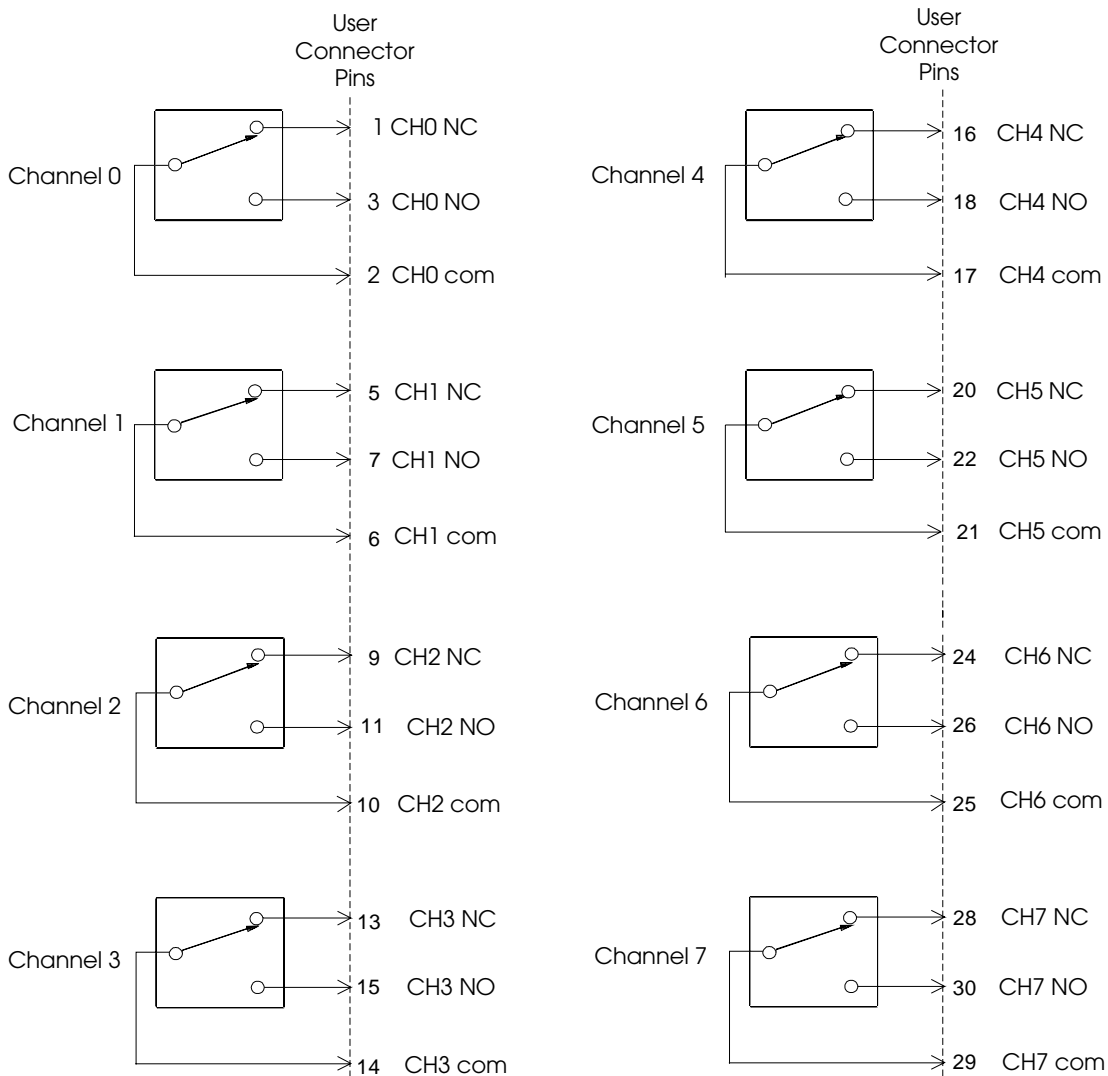


E2273A 8-Channel Form C Switch Wiring Information



MAXIMUM VOLTAGE/CURRENT: The maximum voltage that may be applied to any connector on the E2273A is 200 VDC, 141 VAC rms, or 200 VAC peak. These limits apply only if the product is installed in a humidity-controlled (<60% RH) environment where airborne contaminants and transients are controlled, and there is NOT a relay connection made to power mains. If these conditions CANNOT be maintained, then the maximum voltage is 60 VDC, 48 VAC rms or 68 VAC peak.

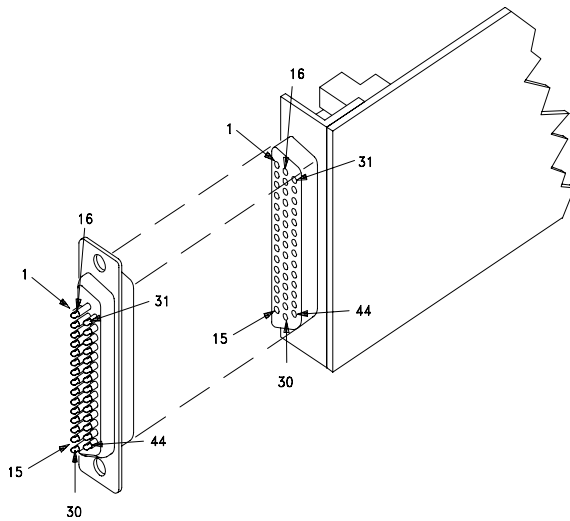
The maximum current (non-inductive) that may be applied to the E2273A is 1 ADC, 1 AACpeak per switch. Maximum power is 40W DC, 40VA AC per switch; 100W DC, 100VA AC per M-Module.



NC = Normally Closed
 NO = Normally Open
 com = Common

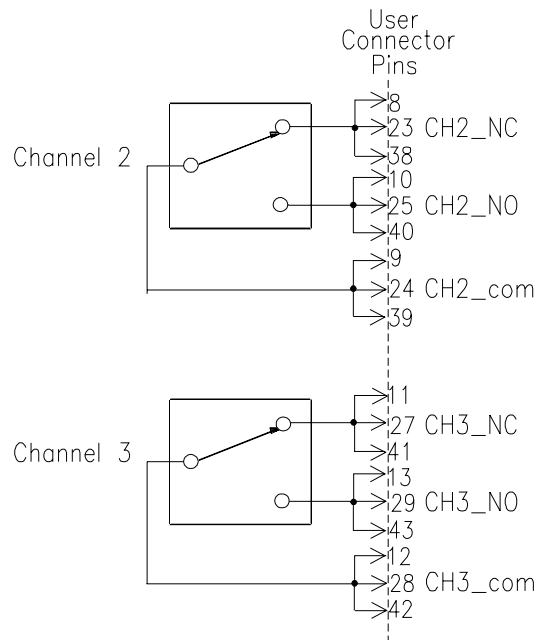
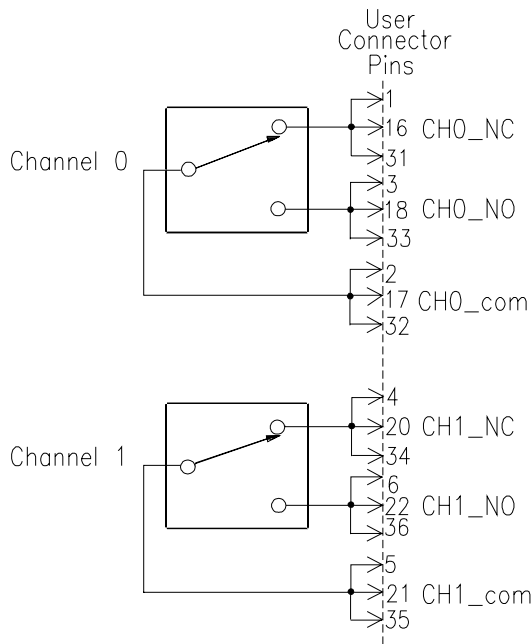
CGND: Pin 4, 8, 12, 19, 23, 31 - 44

E2274A 4-Channel Power Relay Wiring Information



MAXIMUM VOLTAGE/CURRENT: The maximum voltage that may be applied to any connector on the E2274A is 125 VDC, 141 VAC rms, or 200 VAC peak. These limits apply only if the product is installed in a humidity-controlled (<60% RH) environment where airborne contaminants and transients are controlled, and there is NOT a relay connection made to power mains. If these conditions CANNOT be maintained, then the maximum voltage is 60 VDC, 48 VAC rms or 68 VAC peak.

The maximum current (non-inductive) that may be applied to the E2274A is 5 ADC, 5 AACpeak per switch. Maximum power is 100W DC, 100VA AC, per switch; 300WDC, 300VA AC per M-module.

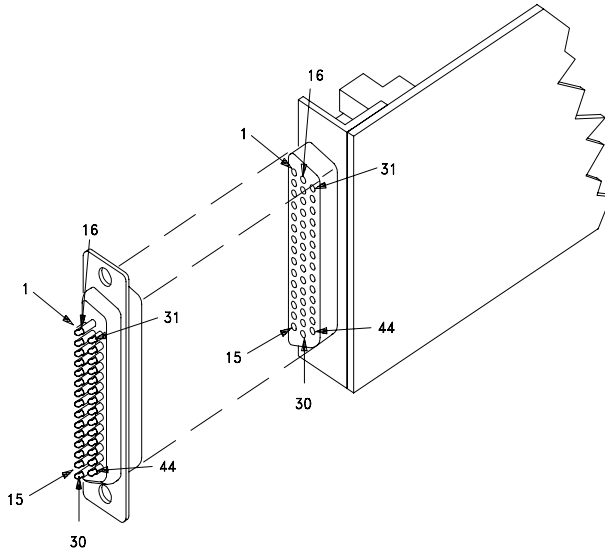


NC = Normally Closed
 NO = Normally Open
 com = Common

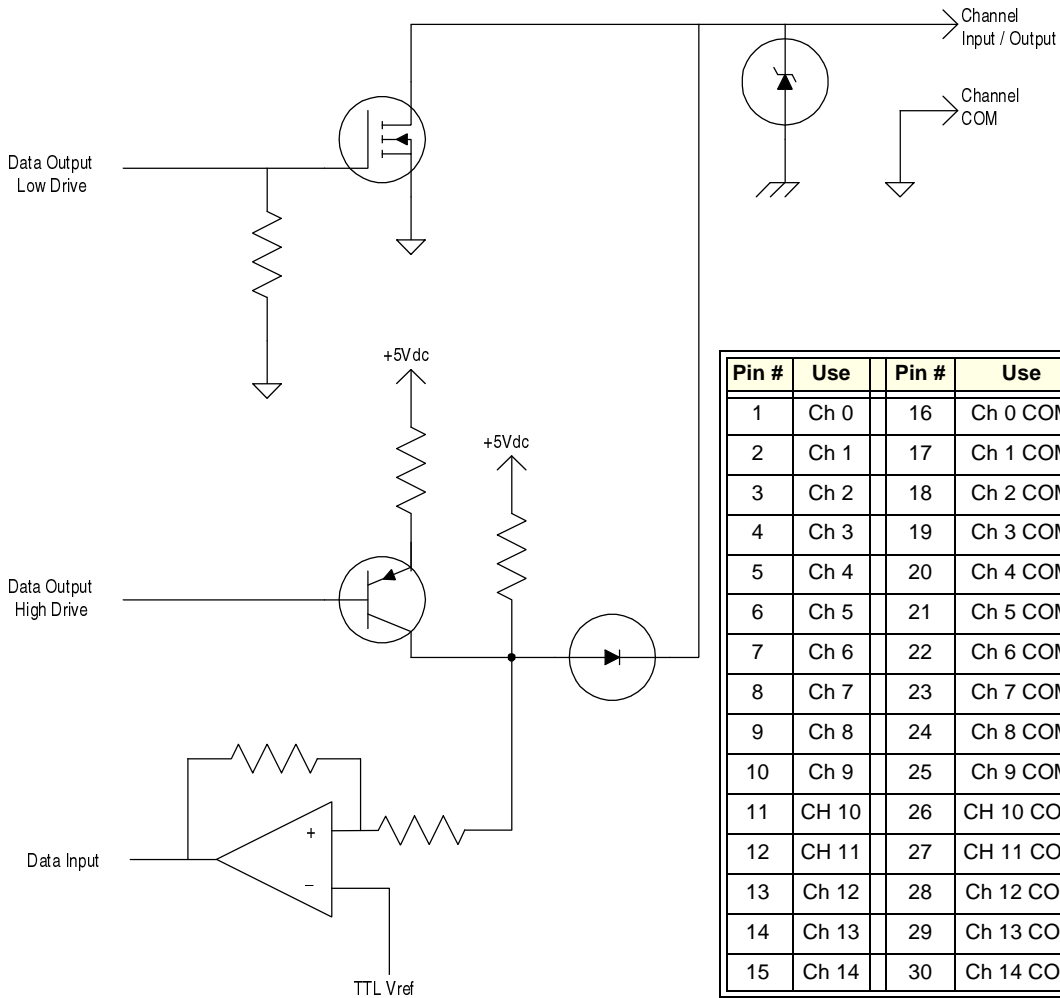
No Connection: Pins 7, 19, 26
 CGND: Pins 14, 15, 30, 37, 44

Caution All three connector pins for each relay contact must be connected together in the field wiring for maximum current capability. For example, for Channel 1, pins 1, 16, and 31 (for NC contacts) must be wired together in the field wiring, likewise pins 3, 18, and 33 (for the NO contact) and pins 2, 17, and 32 (for channel common). You may need to run separate wires from each connector pin and unite them at the device under test or in your cable.

E2290A 16-Bit Digital I/O Wiring Information

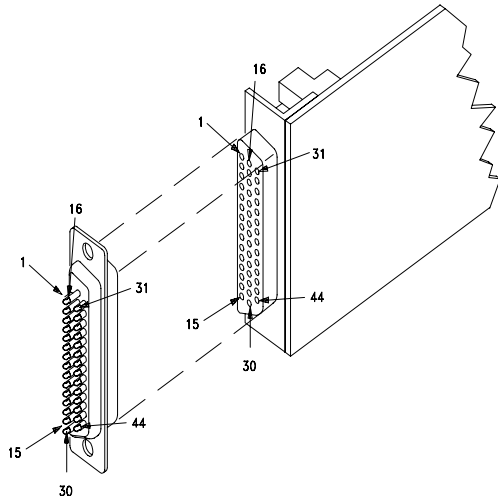


CAUTION The maximum voltage is 30 VDC (any I/O line to chassis).



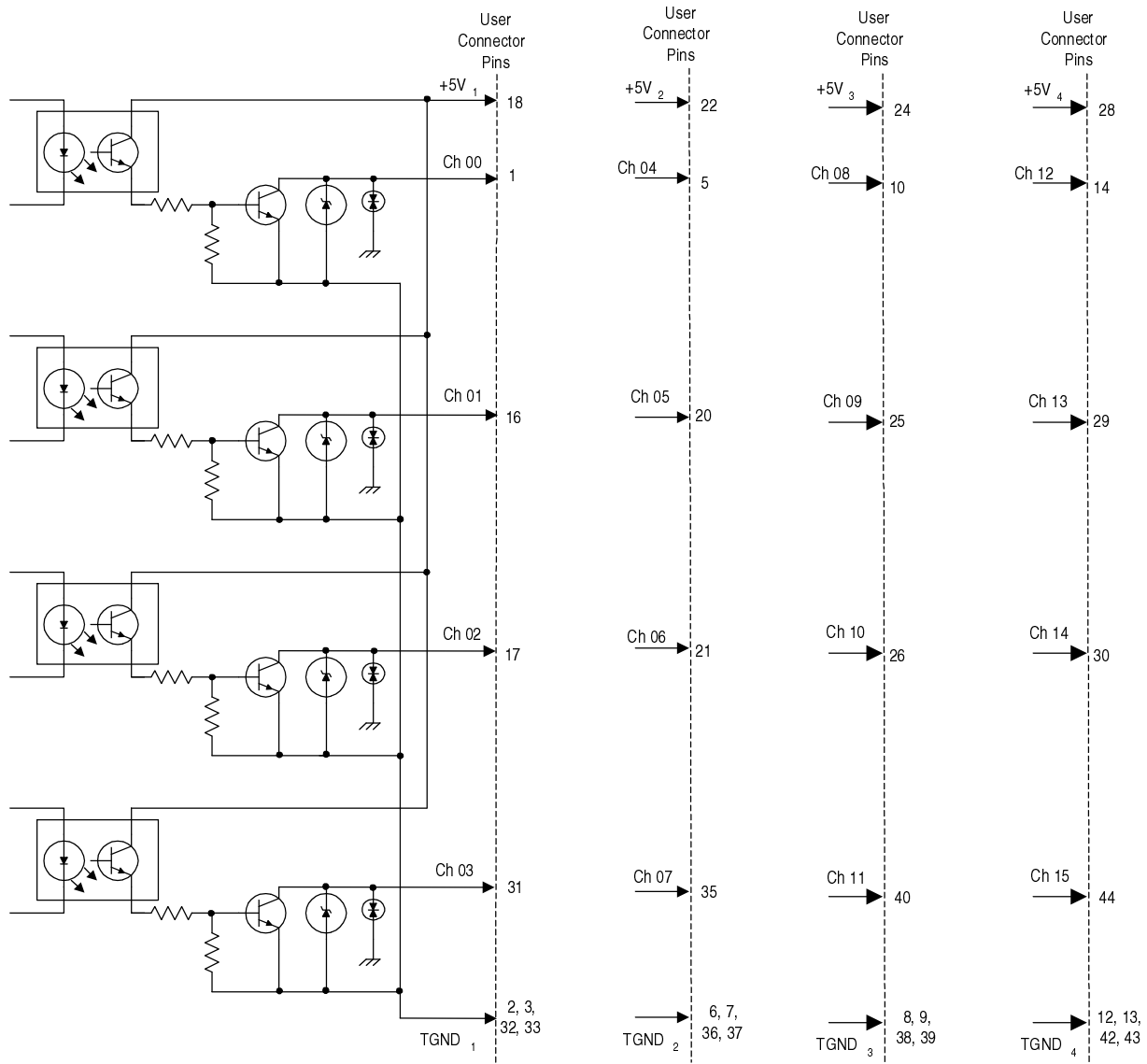
Pin #	Use	Pin #	Use	Pin #	Use
1	Ch 0	16	Ch 0 COM	31	Chassis
2	Ch 1	17	Ch 1 COM	32	Chassis
3	Ch 2	18	Ch 2 COM	33	Chassis
4	Ch 3	19	Ch 3 COM	34	Chassis
5	Ch 4	20	Ch 4 COM	35	Chassis
6	Ch 5	21	Ch 5 COM	36	Chassis
7	Ch 6	22	Ch 6 COM	37	Chassis
8	Ch 7	23	Ch 7 COM	38	Chassis
9	Ch 8	24	Ch 8 COM	39	Chassis
10	Ch 9	25	Ch 9 COM	40	Chassis
11	CH 10	26	CH 10 COM	41	Chassis
12	CH 11	27	CH 11 COM	42	Chassis
13	Ch 12	28	Ch 12 COM	43	Ch 15
14	Ch 13	29	Ch 13 COM	44	Ch 15 COM
15	Ch 14	30	Ch 14 COM		

E2291A 16-Channel Isolated Digital Output Wiring Information



Note: User must supply +5Vdc to the module. You can supply up to four isolated supplies (+5V₁/TGND₁, +5V₂/TGND₂, +5V₃/TGND₃, +5V₄/TGND₄) or they can be combined and one supply used. Refer to the drawing below.

CAUTION The maximum collector-emitter voltage is 36 VDC.



Pins not used: 4, 11, 15, 19, 23, 27, 34, 41

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